DOCUMENT RESUME

ED 130 638 IR 004 170

AUTHOR Elliott, Earl S.; Sebring, Robert H.
TITLE The Effects of Multimedia Instruction on Undergraduate Student Learning.
INSTITUTION Pennsylvania State Univ., University Park. Coll. of Human Development.
PUB DATE Jun 76
NOTE 16p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Educational Television; Higher Education; *Multimedia Instruction; Program Evaluation; *Student Teacher Relationship; *Undergraduate Study; Video Tape Recordings
IDENTIFIERS Pennsylvania State University

ABSTRACT

The technology of multimedia instruction has made rapid strides at Pennsylvania State University in the past 20 years. The media format is an economical way to extend course offerings to many campuses. The emphasis on economy, however, must be balanced with an interest in the quality of instruction in order to produce achievement that is equal to or greater than that attained using conventional methods. The current challenge to educators is to make effective use of technological resources to facilitate good teaching and the effective development of each individual student. Current efforts at Pennsylvania State are centered on the development of two interdisciplinary multimedia courses. Evaluation of success in achieving the objectives of the courses was combined with evaluation of two different modes of instruction: (1) a local instructor who was responsible for the course at the campus, monitored presentations, graded examinations, and held student conferences; and (2) a remote instructor who monitored the use of centrally prepared tapes, while exams were graded centrally and conferences were conducted by telephone. No significant differences occurred on content exams between the local and remote instructor methods. Choice of method should therefore depend on other factors. (KB)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED130638

THE PENNSYLVANIA STATE UNIVERSITY

The Effects of Multimedia Instruction on Undergraduate Student Learning

by

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Earl S. Elliott
Assistant Professor of Human Development

and

Robert H. Sebring
Assistant Professor of Community Development

With the aid and assistance of graduate students:
George Bahner, Joseph Briggs, and Virginia Elliott

June 1976

College of Human Development
University Park, PA 16802

IR004170

THE EFFECTS OF MULTIMEDIA INSTRUCTION

ON UNDERGRADUATE STUDENT LEARNING

Systematic investigation of closed circuit television began at Penn State University during the 1953-54 academic year (Carpenter and Greenhill, 1958). In the beginning, the concept of a "fair test" was applied because acceptance of innovative procedures and application of instructional technology through television was largely unknown. In addition, these same innovations and technological advances lacked credibility among potential users, so that resistance from segments of the academic community was expected. The fair test concept implied the collection and evaluation of reliable information, the correction of faculty observations, and the reduction of biased and prejudicial judgments.

In 1976, acceptance of televised instruction by students is related to the dependability of teaching excellence found in multimedia sections of courses. Likewise, the attitudes of instructors reflect the relative merits of using multimedia instruction compared to other possible procedures. The Carpenter and Greenhill (1958) studies suggested these related problems of higher education should be separated into two distinct kinds of problems: (1) quantity and (2)quality. In their study the problem of quantity was partially solved through the use of television instruction which reached large numbers of students in a variety of classroom situations.

During the past twenty years, the technology of instructional learning has made rapid strides in the delivery of new courses which include: multi-dimensional television presentations in color, video-

tape cassette players, students study guides, coordinated readings, and standardized examinations. In current times, the basic problems of quantity have multiplied as these courses are offered at 18 different locations through resident instruction and continuing education. Coordination of multimedia courses requires cooperative scheduling across campuses, preparation of materials in advance of the term requested, and trained personnel to deliver and monitor their presentation at a variety of locations under differing conditions.

From a strict management viewpoint, one goal of multimedia instruction is the enrollment of the maximum number of students throughout the University at the lowest posible cost. The condition of today's economy has led to increased student enrollments in introductory courses and limited, and even reduced, teaching faculty available at all locations to teach introductory courses. The multimedia format has become an economical way to extend course offerings at many commonwealth campuses.

As an ultimate goal of higher education, this focus on quantity alone may result in practices which produce increased numbers of student credit hours through larger classes, multimedia technology and more instruction by less qualified assistants without maintaining the quality of instruction in the classroom. The question of quality remains open to personal bias, interpretation and value judgments. We believe that multimedia instruction if used correctly can produce equal or even greater academic achievement than conventional methods of instruction.

Educational Assumptions

Chickering (1969) proposed an overview to the theory and action of student development in higher education for young adults. He believes

institutional objectives set the framework for governance of student life and provide the criteria for educational decisions made by colleges and faculties.

Furthermore, the emphasis on training students to become disciplined specialists should give way to an emphasis on educating students, all students, to becoming more autonomous, purposeful persons who act with integrity, subject to their own clear convictions and beliefs. The evidence, according to Chickering, is clear. Higher education does make a difference in the future life styles that students develop. The only real question which concerns Chickering is whether colleges, professors, students and community leaders will make rational decisions which facilitate effective development of the individual and the surrounding environment in positive, rather than negative terms.

Along the same line, the Rothwell Report (1969) states ten principle ideas for the improvement of teaching. Among those listed was the role of library services, the use of a wide range of audio-visual facilities, and the use of field experience in expanding the horizon of higher education beyond the larger group lecture and individual recitation model in common use today (Chickering, 1969). For example, the report states that the young teacher has the right to expect facilities and equipment conducive to good teaching, although these need not be extravagant. Certainly good teaching can occur in very primitive conditions. However, material things can facilitate the process, provided an atmosphere of open learning is available.

If this overall goal of openness can be achieved, then teachers will actively participate in curriculum development which reaches toward the pinnacle of creativity. Quality education can be achieved through a

combination of fine scholarship and excellent instruction (Rothwell, 1969).

Educational technology will continue to attract the interest of educators because it offers alternatives to current educational practice. Our assumptions about educational environments, individual differences and future life styles are being challenged in every academic and professional area. If higher education really makes a difference in behaviors of students, then educators must demonstrate clear differences in the behaviors of students, measurable in terms of instructional impact through achievement toward objectives which are clearly defined and long range goals which are more global, yet measurable. The challenge is clear: How will we make effective use of all our resources in enabling the student and faculty to develop and grow in a stimulating community environment?

At The Pennsylvania State University, current efforts in Instructional Technology are centered on the development of several innovative multimedia courses including several in the College of Human Development. Efforts are coordinated through the Division of Instructional Services, the Office of Vice President for Undergraduate Instruction, the various Colleges, and numerous Commonwealth Campuses. Their combined interest has led to the development of introductory courses which focused on life span human development Individual and Family Studies (IFS 129), infancy and early childhood development (IFS 329) and Community Development 7 (Com D 07) systems thinking applied to community services.

Individual and Family Development

Individual and Family Studies 329 is an interdisciplinary course

focused on infant and early childhood development. The course uses materials drawn from biology, anthropology, sociology, and psychology to provide content for a set of learning materials which includes videotapes, study manual, required reading and examination. Initially, three formats of instruction were conceived: (1) independent study, (2) instructor on location and (3) phone hook-up. Several campuses, including University Park, participated in systematic evaluation of these methods in the academic year 1974-1975. A total of 242 students were included in the study at Commonwealth Campus locations and 700 students at University Park. Content examinations were devised which included a pretest, five unit post test, and second post tests if requested by the students.

Results of their first year of implementation revealed that independent study in the classical sense of the individual working entirely on his/her own schedule was inappropriate at most campus locations for most students at the lower division level. No other significant differences occurred between the achievement levels of students in the instructor present and instructor remote methods. However, differences did occur between high, average, and low achievement students on re-test of units. Neither high nor low achievement students were able to significantly increase their scores on any of the units as a result of a second effort, while students with average achievement consistently performed higher on the re-test than they performed on the first unit test. In addition, sex differences occurred on selected units. For example, women earned significantly higher scores on units which dealt with pre-natal and infant care, while men performed better on units concerned with socialization. In this case, females were predominately Nursing, Education and IFS

majors, whereas males were Sociology, Liberal Arts, Law Enforcement and Corrections (LEC) and Individual and Family Studies (IFS) majors.

In general students enrolled on the University Park (main) Campus tended to earn higher grades in the course regardless of term standing. Deutsch (1975) reported that variations in campus environments may be an important variable which influences motivations of students to succeed in introductory and service courses, regardless of the teaching format.

Community Systems

The course Community Development 07 (Com D 7) , is focused on community systems, community problems, and planning for community change. The course materials for Com D 7 include six separate modules: community systems, criminal justice, juvenile justice, income distribution, land use, and human services. Each of the modules is composed of six to eight units which present course material on a particular system from a community development perspective. Various aspects of community organization and functions, community involvement, community control, and changes needed for improved managements and responsiveness to community needs are examined by the instructors.

These modules represent a multidisciplinary approach to the study of community development. For example, each module is presented by different faculty with specialized training and professional background in their area of emphasis. Theoretically, the advantage for the student is exposure to a wide variety of disciplines and professionals who examine the problems of community development from a systematic perspective which cuts across traditional approaches to community problems. The reality of such exposures is that both instructors and students

report mixed attitudes about such approaches (Sebring, 1975). The multimedia format intends to insure that all students receive the same basic information and core knowledge. In practice, the materials are used by the instructor as resource material, as independent study material, and as material for study in instructor remote coordinated classes.

Method

To evaluate our success in achieving course objectives, curricular and instructional data was gathered from 356 students and 7 instructors who used these multimedia materials during Fall and Winter 1975-76. The required modules, Community Systems and Criminal Justice, are examined in terms of content learning with the same group of students taking both modules. Multiple forms of examination were designed so that Form A and Form B were alternative forms of the same test designed to measure the same content material. During Fall Term campuses were administered Form A while Form B was administered Winter Term. In addition, on each of the campuses, students completed a course evaluation at the end of the required modules and again at the conclusion of the course.

The two principle forms of instruction were operationally defined as follows although variations of this format occurred at each location:

Instructor Present

a. Local instructor, responsible for course at campus, monitors presentations, determines tape usage, initiates student contacts, and fosters student learning.

b. Examinations (multiple-choice) are graded locally.

c. Scheduled student conferences are with local instructor.

Instructor Remote

a. Local instructional specialist presents examinations, monitors use of tapes, and reports student use to University Park instructor.

b. Examinations (multiple-choice) are scored and graded centrally.

c. Student-initiated conferences are arranged by conference telephone with University Park instructor.

d. Review conferences are initiated by University Park instructor following completion of tapes for each module.

e. Initial session under leadership of instructor who visits campus to begin course.

Results of Cognitive Evaluation

The content examinations scores for the two required modules are reported in Table 1 and Table 2. The number of students, mean scores in percentage of items correct, standard deviations, and Kuder-Richardson Formula 20 reliability, are reported by campus location. Table 1 reports the scores by campus for instructor present and instructor remote grouped together for the first module, entitled Community Systems. Table 2 reports the same information for the second module, Criminal Justice. The same group of students were enrolled in the course at the same time, and took the same tests for each campus location. In general no significant differences occurred between instructor present and instructor remote methods of instruction. The uncontrolled elements such as time of day, variations between day and evening classes, appeared to have little consistent effect on the mode of instruction in terms of cognitive learning, but may have some effect on student attitudes toward different

Table 1

Statistical Information on
Instructor Present and Instructor Remote
Modes of Multimedia Instruction:

Topic: Community Systems

	INSTRUCTOR PRESENT					INSTRUCTOR REMOTE				
Campus	A	B	C	D	E	F	G	H	I	J
Number of Students	32	52	38	44	36	28	32	26	16	52
Mean Score in % Correct	85	79	82	81	78	70	83	72	72	68
Standard Deviation	12	10	10	10	13	22	7	11	9	8
KR20 Reliability	.859	.783	.797	.741	.860	.950	.557	.606	.630	.770

Table 2

Statistical Information on
Instructor Present and Instructor Remote
Modes of Multimedia InstructionL

Topic: Criminal Justice

	INSTRUCTOR PRESENT					INSTRUCTOR REMOTE				
Campus	A	B	C	D	E	F	G	H	I	J
Number of Subjects	27	52	31	44	34	25	31	24	52	16
Mean Score in % Correct	81	76	78	77	70	68	79	69	69	70
Standard Deviation	13	12	12	6	10	8	9	7	9	17
KR20 Reliability	.814	.827	.783	.427	.754	.688	.749	.567	.700	.914

modes of instruction.

Even though we acknowledge that assumptions prerequisite to rigorous empirical design could not be implemented, a number of general trends appear to be emerging regarding the effectiveness of different methods of presenting identical content at different Commonwealth Campus locations. Presentation strategies which include instructor present would appear to be most effective on most campuses. However, the instructor present model with an experienced instructor present resulted in higher scores for Commonwealth Campus students only Fall Term on the community systems module. Unfortunately, conditions of instruction were not uniform across campuses, i.e., time of day scheduled, support personnel, and other campus variables. Under these conditions, classes taught through Continuing Education by a new instructor or instructional service specialist full or part-time appeared to be less successful than classes taught by the experienced instructor present.

Discussion

When comparing instructor present versus instructor remote formats, the most successful instructional format occurred, in terms of test scores earned by students, under various instructor models. An experienced instructor in the classroom who used either the Monday, Wednesday, Friday or Tuesday, Thursday sequence, and guided discussion with students concerning material presented in each unit during class periods appeared most successful. Under certain conditions, the instructor remote model appeared to improve during the two terms. As the number of contacts with classes increased through visits, conference calls to the classroom and follow-up calls to individual students, the instructor remote appeared to benefit, so that the concerns and needs of students were anticipated and

met better the second time around.

Another kind of difference occurred in relationship to student affective domain, or "how students felt about the course." Those students who were enrolled in the Instructor Remote Tuesday-Thursday sequence preferred a different format. The experience of two hours of video-tape presentation with only a ten-minute break between presentations was relatively unsatisfactory for most students. These same students viewed the use of multimedia instruction as more [illegible]cable with an instructor present than with the instructor remote. Availability of an instructor to discuss, review and interpret parts of the material presented in each unit was important to most students.

Unfortunately, on most campuses, experienced instructors with superior knowledge of community systems are frequently unavailable, especially on a part-time basis. If multimedia courses such as Com D 07, are to become valid alternatives to conventional instruction, then alternatives to the instructor present model must be developed which meet the demands of quality instruction with limited resources while maintaining personalized instruction.

Some students, particularly freshmen, are unprepared for multimedia instruction which requires active participation with minimum personal direction. Occasionally, campus resources are less than satisfactory for adequate instructional service support. At times the instructional connection between campuses, i.e., telephone hook-up, requires greater coordination between campuses than anticipated by either the campus or the instructor. All of these factors lead to negative evaluation of multimedia courses by students, staff and faculty.

The objectives of improving course content, delivery and availability of introductory courses to beginning students is being met with some

satisfaction and success.

The most satisfactory solution for the use of multimedia instruction appears to vary by campus location. If availability of the course at a maximum number of locations for beginning students is of prime importance, then the use of part-time instructors with multimedia support and/or the use of the instructor remote model are reasonably successful. When class size is relatively small, less than 30 students, the instructor remote model appears to have advantages over the part-time instructor model. Instructional costs are less, contacts with students can be somethat personalized by telephone, and the problems of video-tape presentations to large classes is minimized. On the other hand, with a large class, the presence of an approved instructor makes the course more acceptable to many students. The instructors can guide examinations, focus content and utilize prepared instructional support materials. Under these circumstances, the instructor functions more as a teacher and less as a purveyor of content material.

REFERENCES

Carpenter, C.R. and Greenhill, L.P., An investigation of closed circuit television for teaching university courses. Report Number Two. The Pennsylvania State University, University Park, Pennsylvania 1958.

Chickering, A.W., Education and Identity. Jossey-Bass, San Francisco, 1969.

Deutsch, F., "Final Report Course Improvement Project," (unpublished report, Division of Individual and Family Studies, College of Human Development, The Pennsylvania State University, 1975).

Rothwell, C.E. The Importance of Teaching, a Memorandum to the New College Teacher. Report of the Committee on Undergraduate Teaching, The Hazen Foundation, New Haven, Connecticut, 1969.

Sebring, R.H., Student Study Guide to Community Development 7. Division of Community Development, College of Human Development, The Pennsylvania State University, 1975.

Tyler, Ralph W., Basic Principles of Curriculum and Instruction, The University of Chicago Press, Chicago and London, 1959.